

seedlings were grown in 1923 and 125 of them were selected for further trial. In 1924, over 10,000 seedlings were grown from specially selected plants and of these 100 were considered early enough to be parent plants. Through further trial and elimination it is planned to reduce the list of selections to a group of 12 or 15 sorts that will bloom and give a satisfactory range of color and form for use during the first half of September and a like collection which will produce the bulk of their bloom during the last two weeks of September.

Task Beset With Difficulties

This task has been beset with many difficulties. The July and August flowering varieties are manifestly too early for garden or commercial use but as parents for early-flowering strains they are proving invaluable. Seedling chrysanthemums like other hybrid forms present every possible expression of form and color. In this respect the plant is interesting to work with. In fact a field of seedling chrysanthemums presents a most attractive mosaic when the plants are spaced $1\frac{1}{2}$ by 3 feet and each plant develops to occupy the space allotted it. Besides adding an attractive feature to the trial grounds each fall the work has resulted in the development of early-blooming sorts including a wide range of form and color.

As soon as satisfactory forms of these chrysanthemums are selected the next task will be to multiply them. This will be done to such an extent as to make them available, through the trade, to the gardeners of the North who wish to prolong the floral display of the autumn.

FURMAN LLOYD MULFORD.

C E L E R Y The black-heart disease of celery is found in
Disease and its most prevalent and destructive forms in
Its Control Florida and California, two of the largest celery-
 growing districts in the United States, in both of
 which artificial irrigation is used extensively. The irrigation is important, as it will appear later that proper irrigation is the only satisfactory method for the control of the disease. The disease, most destructive in Florida because of the heavy rainfall during March and April following several months of drought, has been known since the early commercial culture of celery. Since, until recently, there were no methods for the control of black heart, the growers have lost heavily from it every year.

The disease attacks principally the tender growing heart of the plant, producing a blackening of the tissues, and hence the common name "black heart." As the disease develops, the entire heart is killed by a typical dry rot, which is often followed by a slimy soft rot, caused by secondary organisms of the *Bacillus carotovorus* group. The malady is nonparasitic in nature and is not to be confused with the common heart rot found mainly in the northeastern United States. The black heart causes a yellowing of the entire leafy portion of the plant, with a loss of the green color, followed by a browning and death of the tissues involved. The diseased plants are worthless and many fields in Florida have been observed in which all the plants were affected.

For many years the celery growers in Florida and a number of experimental workers thought the disease was caused by improper fertilization. In 1906, R. Y. Winters, conducting preliminary fertilizer experiments in the Sanford section, came to the conclusion that the disease was caused by the excessive applications of kainit and nitrate of soda. He also thought that other adverse conditions for plant growth, such as unbalanced water relations, improper mixing of fertilizer, and the attack of the plants by blights, were favorable to the occurrence of the disease, but he had no experimental data to support these general conclusions.

The writer conducted fertilizer experiments with celery in the Sanford section over a period of five years, using over 60 different fertilizer combinations—the ammonia, potash, and phosphate being derived from as many different sources as possible. Nitrate of soda was applied to one plot at the excessive rate of 1 ton to the acre. Other forms of ammonia and potash were applied in the same manner and there was not a single instance in which the disease appeared that would indicate that fertilizer from different sources had any relation to the disease. On the other hand, the disease was readily produced under field conditions by allowing the soil to become excessively dry and then flooding. After such treatment the disease would appear within 48 hours. It was also produced by removing healthy plants from the soil and placing them in jars of water over night.

Difference in Susceptibility

A considerable difference in the susceptibility of certain varieties to black heart was found. Of all those tested the Old Golden strain proved to be the most susceptible and Meisch's Wonderful or Special strains the most resistant to the disease.

Celery black heart has been controlled experimentally and in a practical way by Florida growers by first selecting a strain of celery that is highly resistant to the disease, and then carefully regulating the supply of water throughout the growing period of the plants. Celery is a water-loving plant, but it will not stand excessive flooding, especially if it has been stunted during growth. It is necessary, however, to harvest the crop before it has reached maturity, as mature plants are very susceptible to the disease if other unfavorable conditions occur.

ARTHUR C. FOSTER.

CITRANGES and Some Related Hybrid Fruits The breeding of cold-resistant citrus fruits suitable for culture in the southern part of the Cotton Belt has been in progress for many years. A large group of hybrids known as "citranges" were first produced by crossing the commercially worthless trifoliolate orange of Japan with the ordinary sweet orange. The citranges are unlike either parent, and serve chiefly as hardy substitutes for the lemon. The Rusk citrange has been more widely distributed than the others, its prolific nature, evergreen habit, and handsome appearance, especially when carrying a full crop of bright orange-red fruits, giving it value as an ornamental in addition to its fruits.